MediaEval 2016: A multimodal system for the Verifying Multimedia Use task

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Why use a multimodal system ? Because there are several types of hoax !

➙ False information present in the text content

➙ Forged image

➙ Image reused for an other event

Global Hypotheses

➙ Prediction is first made at the image-level, then propagated to the tweets that contain the image

➙ Translation if the detected language is different than english

Text-based approach (run-T)

Detect if the message is style-wise similar to known hoax

➙ Capture similar comments between an unknown image and an image from the training set (e.g. *It's photoshopped*) and similar genres of comments (e.g. presence of smileys)

➙ Prediction made by a k-Nearest-Neighbor approach (in this case $k = 1$)

Source-based approach (run-S)

Detect if the message is related to a trustworthy source

➙ 2 type of sources searched: news-related organisms (e.g. press agencies) and explicit citations of the source of the image (e.g. the pattern *photographed by + Name*)

➙ Predict *real* if a trustworthy source is detected, *fake* else

Example

Image-based approach (run-I)

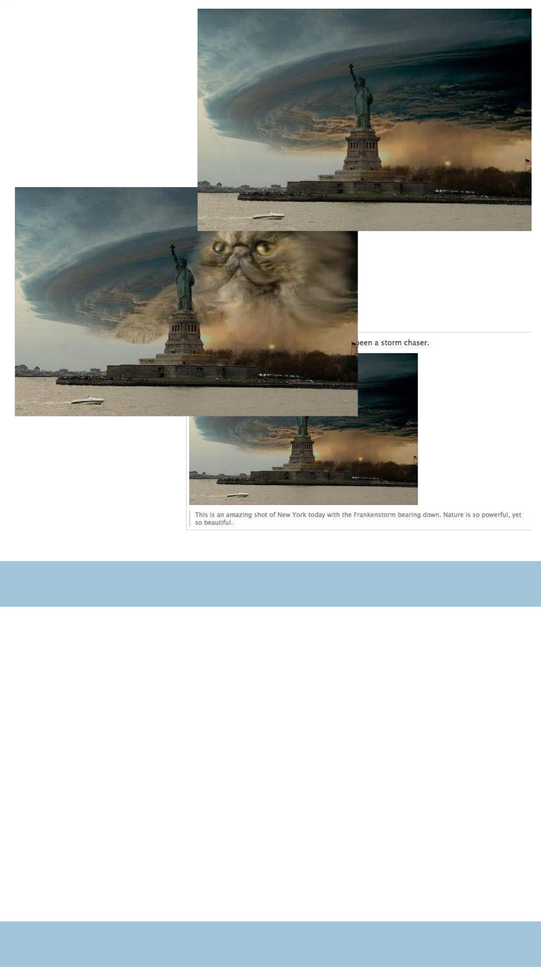
Detect a known image

➙ Compare an unknown image to an image database of 8 000 known images (7 500 fake and 500 real images)

➙ Database images extracted from 5 specialized websites

➙ Description of an image by a deep CNN layer output (4096-dimensional descriptor)

➙ Predict *real* (resp. *fake*) if a *real* (resp. *fake*) similar image is found in the database, *uncertain* else



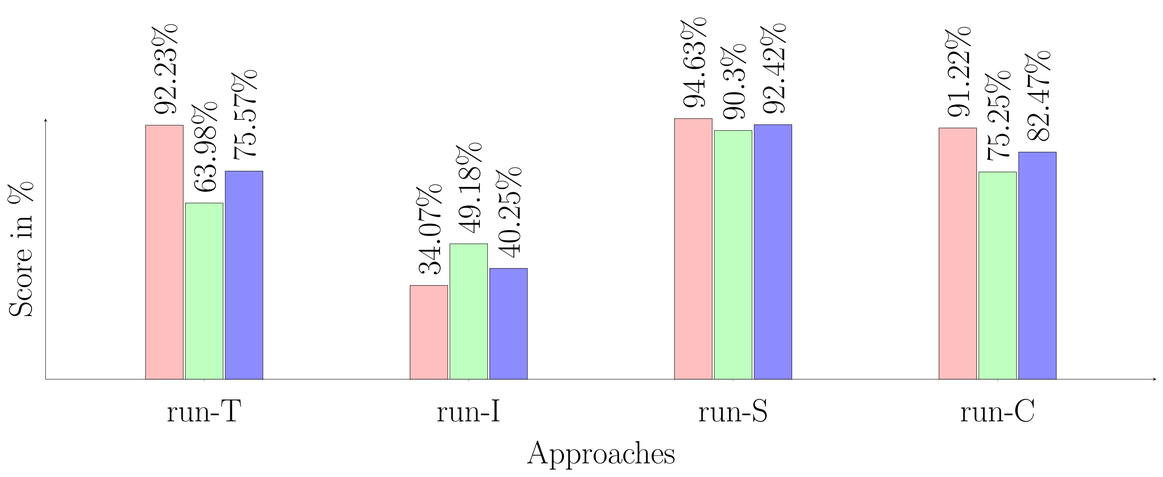
Combination approach (run-C)

Combine the three previous predictions

➙ Late fusion: learn the best combination

➙ Boosting algorithm (adaboost.MH, parameters of the machine learning algorithm are set by cross-validation on the training data)

Results



➙ 2 228 messages to classify, corresponding to 130 images

➙ 86 % to the test tweets are associated with one or more images (the rest is associated with video)

Conclusion

➙ Text-based approach: competes with the source-based approach in terms of recall but tends to classify every tweet as *fake*

➙ Image-based approach: low precision compared with estimations on the training set. This may be due to: (1) small and unbalanced reference database; (2) original image and forged ones are sometimes very similar; (3) presence of stamps

➙ Combination-based approach: does not offer any gain due to overfitting

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